The listing of claims will replace all prior versions, and listings, of claims in the application:

<u>Listing of Claims:</u>

1. **(Currently Amended)** An optical waveguide preform comprising:

a central core glass surrounded by and in contact with a clad glass layer to from a preform, the preform having a first and a second end and an axis there between, and the clad layer comprising a plurality of annular segments, that extend sequentially along the axis and <u>with densities that differ along the axis from one another,</u> wherein the segments are characterized by a pre-selected density different form the pre-selected density of the segments immediately adjacent the each segment, and, the each segment density is either higher or lower than both immediately adjacent segments.

2. **(Original)** The optical waveguide preform of claim 1 in which the segments, that have a pre-selected density lower than that of adjacent segments, contain pores.

3. **(Original)** The optical waveguide preform of claim 2 in which the segments that have a pre-selected density higher than that of adjacent segments also contain pores.

4. **(Original)** The optical waveguide preform of claim 2 in which the pores are elongated and have their long dimension oriented along the axis of the preform.

5. **(Currently Amended)** <u>An optical waveguide preform comprising:</u>

<u>a central core glass surrounded by and in contact with a clad glass layer to from a preform, the preform having a first and a second end and an axis there between, and the clad layer comprising a plurality of annular segments that extend sequentially along the axis and with densities that differ along the axis from one another wherein, the segments are characterized by a pre-selected density different form the pre-selected density of the segments immediately adjacent the each segment, and the each segment density is either higher or lower than both immediately adjacent segments , the segments that have a pre-selected density lower than that of adjacent</u>

segments contain pores and the segments that have a pre-selected density higher than that of adjacent segments also contain pores , wherein ~~The optical waveguide preform of claim 3 in which~~ the pores are elongated and have their long dimension oriented along the axis of the preform.

6. **(Original)** The optical waveguide preform of claim 4 in which the elongated pores form a periodic array.

7. **(Original)** The optical waveguide preform of claims 5 in which the elongated pores form a periodic array.

8. **(Original)** The optical waveguide preform of either of one of claims 6 or 7 in which the pitch of the periodic array is such that a waveguide fiber drawn from the preform to a pre-selected diameter contains a periodic array of elongated pores having a pitch in the range of 0.4 μm to 20 μm.

9. **(Original)** The optical waveguide preform of either of claims 6 or 7 in which the elongated pores have a diameter and the ratio of the diameter to the pitch of the periodic array is in the range of about 0.1 to 0.9.

10. **(Original)** The optical waveguide preform of claim 1 in which the core glass has a refractive index profile which is selected from a group consisting of a step, a rounded step, a trapezoid, an α-profile, and a segmented profile wherein the segments of the segmented profile are selected from a group consisting of a porous layer, a step, a rounded step, a trapezoid, a rounded trapezoid, and an α-profile.

11. **(Original)** The optical waveguide preform of claim 10 in which the core glass comprises silica glass having a dopant selected from the group consisting of germania, alumina, phosphorus, titania, boron, and fluorine.

12. **(Original)** The optical waveguide preform of claim 11 in which the core glass comprises silica doped with a substance selected from the group consisting of erbium, ytterbium, neodymium, thulium, and praseodymium.

13. **(Original)** The optical waveguide preform of claim 1, wherein, the density of a clad layer segment has one of two pre-selected values.

14. **(Original)** The optical waveguide preform of claim 13, wherein, the clad glass layer segment having the first one of the two pre-selected densities is a homogeneous first composition, and the clad glass layer segment having the second one of the two pre-selected densities comprise a porous first composition.

15. **(Original)** The optical waveguide preform of claim 14, wherein, the pores of the clad layer having the second pre-selected density are elongated and have their long dimension oriented along the axis of the preform.

16. **(Original)** The optical waveguide preform of claim 15 in which the elongated pores form a periodic array.

17. **(Original)** The optical waveguide preform of claim 16 in which the pitch of the periodic array is such that a waveguide fiber drawn from the preform to a pre-selected diameter contains a periodic array of elongated pores having a pitch in the range of 0.4 μm to 20 μm.

18. **(Original)** The optical waveguide of claim 13, wherein, the clad glass layer segment having the first one of the two pre-selected densities is a homogeneous first composition having a dielectric constant, and the clad glass layer segment having the second one of the two pre-selected densities comprises a porous first composition, wherein, the pores are elongated and the long dimension of the pores are oriented along the preform axis, and wherein, the elongated

pores are filled with a material having a second dielectric constant, wherein the first and second dielectric constants differ by a factor of at least three.

19. **(Original)** The optical waveguide 18 in which the elongated filled pores form a periodic array.

20. **(Original)** The optical waveguide preform of claim 19 in which the pitch of the periodic array is such that a waveguide fiber drawn from the preform to a pre-selected diameter contains a periodic array of elongated pores having a pitch in the range of 0.4 μm to 20 μm.

21. **(Original)** An optical waveguide fiber drawn from the preform of any one of claims 1-7 or claims 10-20.

22. **(Original)** An optical waveguide fiber drawn from the preform of any one of claims 1-7 or claims 10-20 in which the core ahs a refractive index profile and the segment densities are selected to provide in conjunction with the core profile a total dispersion which alternates between positive and negative values as the segment density alternates between different pre-selected densities, to provide a waveguide fiber having a net dispersion equal to a pre-selected value.

23. **(Original)** A method of making an optical waveguide fiber preform comprising the steps:

a) fabricating a core preform having a long axis;

b) fabricating a plurality of glass tubes having an inside and an outside dimension and a long axis;

c) forming along the long axis in each of the plurality of glass tubes a number, N, of sections of reduced inside and outside dimension, wherein, the N reduced dimension sections are spaced apart, each from another, by a section of the tube;

d) arranging the plurality of tubes of step C) in an array surrounding the core preform; wherein the long axis of the core preform is substantially parallel to the long axes of the tubes.

24. **(Original)** The method of claim 23 in which the tubes of step b) have a cross section shape selected from the group consisting of a circle, a triangle, and parallelogram, and a polygon.

25. **(Original)** The method of claim 23 in which the array is random

26. **(Original)** The method of claim 23 in which the array is periodic.

27. **(Original)** The method of claim 23 in which the reduced inside dimension is zero.

28. **(Original)** The method of claim 23, in which the tube has a first composition and a first dielectric constant, and during or before the forming step c) each of the sections which space apart the N sections are filled with a material having a second composition and a second dielectric constant, wherein the first dielectric constant differs from the second dielectric constant by a least a factor of three.

29. **(Original)** The method of claim 23, in which the tube has a first composition and a first refractive index, and during or before the forming step c) each of the sections which space apart the N sections are filled with a material having a second composition and a second refractive index, wherein the first refractive index is greater than the second refractive index.

30. **(Original)** The method of claim 23 further including the steps:

e) inserting the arrangement of step d) into an outer tube; and

f) collapsing the outer tube onto the arrangement.

31. **(Original)** The method of claim 30 further including the step of depositing glass soot particles onto the outer tube.

32. **(Original)** The method of claim 23 further including the steps:

e) bundling the arrangement of tubes of step d) to hold them in registration each to another; and,

f) depositing glass soot onto the bundle.

33. **(Original)** The method of claim 32 in which the step of bundling includes tacking the glass tubes each to another and the innermost tubes to the core preform by means of heating the tubes.

34. **(Original)** The method of claim 32 in which the step of bundling includes tacking the glass tubes each to another and the innermost tubes to the core preform using a glass frit.

35. **(Original)** A method of making an optical waveguide fiber comprising the steps:

a) fabricating a preform in accord with any of one of claims 23-34;

b) sealing one end of the glass tubes;

c) drawing a waveguide fiber from the preform end opposite the preform end having sealed tubes; and,

d) applying a vacuum to the preform end opposite the end being drawn.

36. **(Original)** A method of making an optical waveguide fiber comprising the steps:

a) fabricating a core preform;

b) fabricating a plurality of glass rods having a cross sectional shape;

c) arranging the plurality of rods in an array surrounding the core preform such that the array contains a plurality of pores;

d) inserting the array of rods and the core preform into a tube to form a draw preform;

e) drawing an optical waveguide fiber from the draw preform; and,

f) during step e) applying a varying pressure to the tube.

37. **(Original)** The method of claim 36 in which the applied pressure varies between atmospheric pressure and a pre-selected pressure below atmospheric pressure.

38. **(Original)** The method of claim 37 in which the pre-selected pressure is sufficient to at least partially collapse the pores.

39. **(Original)** The method of claim 37 in which the applied pressure varies between a first pre-selected pressure greater than or equal to atmospheric pressure and a second pre-selected pressure greater than the first pre-selected pressure.